



RESEARCH AND DEVELOPMENT PROGRAM

INVESTIGATOR'S BIOGRAPHICAL SKETCH (Not to Exceed Four Pages)

Table with 2 columns: NAME (Mona Kathryn Garvin, Ph.D.) and POSITION TITLE (Assistant Professor)

EDUCATION / TRAINING (Begin with Baccalaureate or other initial professional education, such as nursing, and include post-doctoral training. Do not include Honorary Degree.)

Table with 4 columns: NAME, LOCATION OF INSTITUTION; DEGREE (if applicable); YEAR AWARDED; FIELD OF STUDY. Lists education from The University of Iowa.

NOTE: The Biographical Sketch may not exceed four pages. Items A and B (together) may not exceed two of the four-pages.

A. Positions and Honors

(List in chronological order previous positions, concluding with your present position. List any honors, professional memberships or present membership on any Federal Government public advisory committee.)

Positions and Employment:

- 2003 Software Engineering Intern, Advanced Clinical Applications Group, Vital Images, Inc., Plymouth, MN
2003 - 2004 Graduate Research Assistant, Department of Biomedical Engineering, The University of Iowa, Iowa City, IA
2004 - 2008 Graduate Research Assistant, Dept. of Electrical and Computer Engr., The University of Iowa, Iowa City, IA
2008 Assistant Research Engineer, Dept. of Electrical and Computer Engr., The University of Iowa, Iowa City, IA
2008 - now Assistant Professor, Dept. of Electrical and Computer Engineering, The University of Iowa, Iowa City, IA

Other Experience and Professional Memberships:

- 2006 - now Member, Association for Research in Vision and Ophthalmology (ARVO)
2007 - now Member, Society of Photographic Instrumentation Engineers (SPIE)
2008 - now Member, Institute of Electrical and Electronics Engineers (IEEE)
2008 - now Member, American Society for Engineering Education (ASEE)

Honors:

- 2003 B.S. and B.S.E. with highest distinction (best GPA in The College of Engineering)
2003 Collegiate Scholar Award, The University of Iowa
2003 Outstanding Graduating Senior Award, The University of Iowa
2007 The Michael B. Merickel Best Student Paper Award, SPIE Medical Imaging Symposium
2007 Graduate Research Award, Iowa Institute for Biomedical Imaging

B. Selected peer-reviewed publications (in chronological order)

(Do not include publications submitted or in preparation)

- 1. M. Haeker (Garvin), M. D. Abramoff, R. Kardon, and M. Sonka, "Segmentation of the surfaces of the retinal layer from OCT images," in Proceedings of the 9th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI 2006), Part I, Lecture Notes in Computer Science, vol. 4190. Springer, 2006, pp. 800-807. (Peer reviewed based on full paper submission.)

2. **M. Haeker (Garvin)**, X. Wu, M. D. Abràmoff, R. Kardon, and M. Sonka, "Incorporation of regional information in optimal 3-D graph search with application for intraretinal layer segmentation of optical coherence tomography images," in *Information Processing in Medical Imaging (IPMI 2007)*, Lecture Notes in Computer Science, vol. 4584, Springer, 2007, pp. 607–618. (Peer reviewed based on full paper submission.)
3. **M. Haeker (Garvin)**, M. D. Abràmoff, X. Wu, R. Kardon, and M. Sonka, "Use of varying constraints in optimal 3-D graph search for segmentation of macular optical coherence tomography images," in *Proceedings of the 10th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI 2007)*, Lecture Notes in Computer Science, vol. 4791, Springer, 2007, pp. 244–251 (Peer reviewed based on full paper submission.)
4. **M. K. Garvin**, M. D. Abràmoff, R. Kardon, S. R. Russell, X. Wu, and M. Sonka, "Intraretinal layer segmentation of macular optical coherence tomography images using optimal 3-D graph search," *IEEE Transactions on Medical Imaging*, vol. 27, no. 10, Oct. 2008, pp. 1495–1505. PMID: PMC2614384
5. H.W. van Dijk, P. H. B. Kok, **M. K. Garvin**, M. Sonka, R. P. J. Michels, R. O. Schlingemann, F. D. Verbraak, and M. D. Abràmoff, "Selective loss of inner retinal layer thickness in type 1 diabetic patients with minimal diabetic retinopathy," *Investigative Ophthalmology and Visual Science*, vol. 50, no. 7, pp. 3404-3409, July 2009. PMID: 19151397
6. **M. K. Garvin**, M. D. Abràmoff, X. Wu, S. R. Russell, T. L. Burns, and M. Sonka, "Automated 3-D intraretinal layer segmentation of macular spectral-domain optical coherence tomography images," *IEEE Transactions on Medical Imaging*, 2009, vol. 28, no. 9, pp. 1436-1447, Sept. 2009. PMID: 19278927
7. M. D. Abràmoff, K. Lee, M. Niemeijer, W. L. M. Alward, E. C. Greenlee, **M. K. Garvin**, M. Sonka, Y. H. Kwon, "Automated segmentation of the cup and rim from spectral domain OCT of the optic nerve head," *Investigative Ophthalmology and Visual Science*, 2009, vol. 50, no. 12, pp. 5778-5784, Dec. 2009. PMID: 19608531
8. K. Lee, M. Niemeijer, **M. K. Garvin**, Y. H. Kwon, M. Sonka, and M. D. Abràmoff, "Segmentation of the optic disc in 3-D OCT scans of the optic nerve head," *IEEE Transactions on Medical Imaging*, vol. 29, no. 1, pp. 159-168, Jan. 2010. PMID: 19758857
9. H. W. van Dijk, F. D. Verbraak, P. H. B. Kok, **M. K. Garvin**, M. Sonka, K. Lee, J. H. DeVries, R. P. J. Michels, M. E. J. van Velthoven, R. O. Schlingemann, and M. D. Abràmoff, "Decreased retinal ganglion cell layer thickness in type 1 diabetic patients," *Investigative Ophthalmology and Visual Science*, in press. PMID: 20130282
10. G. Quellec, K. Lee, M. Dolejsi, **M. K. Garvin**, M. D. Abràmoff, and M. Sonka, "Three-dimensional analysis of retinal layer texture: Identification of fluid-filled regions in SD-OCT of the macula," *IEEE Transactions on Medical Imaging*, in press.
11. Q. Song, X. Wu, Y. Liu, **M. K. Garvin**, and M. Sonka, "Simultaneous searching of globally optimal interacting surfaces with convex shape priors," in *CVPR 2010: IEEE Conference on Computer Vision and Pattern Recognition*, in press. (Peer reviewed based on full paper submission.)
12. Z. Hu, M. D. Abràmoff, Y. H. Kwon, K. Lee, and **M. K. Garvin**. "Automated segmentation of neural canal opening and optic cup in 3-D spectral optical coherence tomography images of the optic nerve head," *Invest. Ophthalmol. Vis. Sci.*, accepted.
13. Z. Hu, M. Niemeijer, M. D. Abràmoff, K. Lee, and **M. K. Garvin**, "Automated segmentation of 3-D spectral OCT retinal blood vessels by neural canal opening false positive suppression," *Proceedings of the 13th International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI 2010)*, Lecture Notes in Computer Science, accepted. (Peer reviewed based on full paper submission.)

## C. Research Support

List selected ongoing or completed (during the last three years) research projects (federal and non-federal support). Begin with the projects that are most relevant to the research proposed in this application. Briefly indicate the overall goals of the projects and your role (e.g. PI, Co-Investigator, Consultant) in the research project. Do not list award amounts or percent effort in projects.

- 2010 – 2015, Kardon/Abràmoff, Directors, Department of Veterans Affairs Center of Excellence for the Prevention and Treatment of Visual Loss  
The goal is to direct scientists and clinicians in a research program directed towards diagnosis and treatment of visual manifestations of traumatic brain injury (TBI), development of imaging tools to further telemedical diagnosis of retinal and optic nerve diseases using computerized image analysis and low cost portable eye cameras, and to test the use of neurotrophic growth factors and neuro-protectants in the prevention and reversal of vision loss from optic nerve disorders.  
Role: Co-investigator
- 2009 – 2012, R01EY018853 NEI (NIH), Sonka/Abràmoff/Kardon, PI, “Focal Structure-Function Relationships in Macular Layers from 3D Spectral OCT”  
The goal is to determine which structural properties of the layers of the macula – obtained from three-dimensional image analysis of spectral domain optical coherence tomography (3-D OCT) – are associated with visual sensitivity, a measure of function.  
Role: Co-investigator
- 2008 – 2011, Veterans Administration Rehabilitation Research and Development Grant, Kardon, PI, “Rehabilitation of Glaucoma Using Computer-Analyzed Eye Images”  
The main goal is to develop and implement an automated imaging/analysis system for the diagnosis, management, and rehabilitation of glaucoma in veterans with an eventual telemedicine application.  
Role: Co-Investigator
- 2010 – 2015, R01EY019112 NEI (NIH), Sonka/Abràmoff, PI, “Retinal Therapy Guided by 3D OCT Analysis”  
The main goal is to relate information about patient-specific retinal composition and structure with treatment outcome in age-related macular degeneration using 3D OCT and image analysis.
- 2009 – 2010, internal grant with The University of Wisconsin Eye Research Institute, McLennan, PI, “3D Analysis of Spectral Domain OCT Images in Feline Models of Optic Neuropathies”  
Role: Co-Investigator  
The main goal is to develop and validate the use of 3-D image analysis of SD-OCT of the retinal layers as a reliable and reproducible technique in the longitudinal assessment of the status of retinal damage in cats.
- 2010, NEI subcontract R009040554, Kardon, subcontract PI (Kupersmith, NEI grant PI), “Optical Coherence Tomography (OCT) Substudy for Idiopathic Intracranial Hypertension Treatment Trial (IIHTT)”  
Role: Co-Investigator  
The goal is to demonstrate levels of alteration in retina and optic nerve due to papilledema.

## D. Time and Effort Statement

Indicate percentage of time spent on research, clinical, teaching/mentoring, and administration. List persons mentored in last 3 years and type of mentoring awards.

Current time/effort allocation: 70% research, 25% teaching/mentoring, 5% service

*Undergraduate students mentored (in a lead research advisor role)*

2008 – now, Philip Brezinksi

*Graduate students mentored (in a lead research advisor role)*

2008 – now, Bhavna Antony, current Ph.D. candidate (received M.S. under my direction in December 2009)

2008 – now, Zhihong Hu, current Ph.D. candidate

2010 – now, Jui-Kai Wang, current Ph.D. candidate

*Graduate students mentored (in co-advisor role)*

2010 – now, Qiao Hu, current M.S./Ph.D. candidate (co-advisor with Prof. Michael Abramoff and Prof. David Andersen)

**E. Significant Life Events (OPTIONAL)**

List any significant life events that have interrupted the PI's research activities for a significant period of time.